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WOOD USED FOR TIGHT COOPERAGE STOCK IN 1905.

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In gathering these statistics on the annual production of tight cooperage stock the Forest Service was especially indebted to the Tight Barrel Stave Manufacturers' Association for assistance in securing complete reports. The figures given are based on statements from 220 manufacturers.

Table 1 shows that during the calendar year 1905 the total production of tight cooperage stock, consisting almost wholly of oak, amounted to 241,193,000 staves, with a value of $9,637,224, and 12,959,000 sets of heading, with a value of $3,366,740, making the total value $13,003,964. Expressed in board measure, the total amount of wood was approximately 350,000,000 board feet. The quantity is more than 12 per cent of the total amount of oak cut into lumber during the previous year (1904), according to the preliminary report issued by the Bureau of the Census.

Table 1.—*Quantity and value of tight cooperage stock produced in 1905.*

STAVES.

	Number.	Per cent.	Value.
	Thousand.		
Sawed [a]	202,369	83.9	$7,132,460
Bucked and split	10,792	4.5	620,698
Hewed	10,396	4.3	800,325
Ale and beer	17,636	7.3	1,083,741
Total	241,193	100.0	9,637,224

HEADING.

	Sets.	Per cent.	Value.
	Thousand.		
Sawed [b]	11,023	85.1	$2,894,890
Beer	1,936	14.9	471,850
Total	12,959	100.0	3,366,740

[a] Includes 48,563,000 alcoholic staves, valued at $2,735,185.
[b] Includes 3,478,000 sets of alcoholic heading, valued at $1,501,000.

Statistics on the output of bucked and split stock are very difficult to secure because so much of it is produced in very small quantities by farmers in the remote districts of the hardwood forest area, who keep

no record. It is probable that the figures given for the total fall somewhat short of the actual amount.

Table 2 summarizes the production of staves by States and classes, arranged according to method of production. Four classes are distinguished—sawed, bucked and split, hewed, and beer stock. The importance of sawed staves is strikingly shown by the fact that they constitute 83.9 per cent of the total number. Beer stock ranks next, with 7.3 per cent, followed by bucked and split stock, with 4.5 per cent, and hewed stock, with 4.3 per cent. Kentucky leads in the production of sawed staves and beer stock, furnishing 23.3 per cent of the former and 68.8 per cent of the latter. Louisiana, with 25.9 per cent of the bucked and split stock and 71 per cent of the hewed stock, holds first place in the production of these staves.

Hewed staves are manufactured chiefly for the foreign market, and most of the work is done by expert foreign laborers, who, by their special skill and knowledge of the requirements of foreign trade, do most satisfactory work. The process of manufacture is a simple one, since the work is done almost entirely by hand. Clear, straight-grained trees are absolutely essential for the production of straight staves of uniform thickness, and before the cylinder saw had been perfected all staves were manufactured by hand and only the choicest oak could be used. More recently, since material of high quality has become more difficult to obtain and the demand for tight cooperage stock has greatly increased, the cylinder saw has been resorted to in order to use large quantities of timber which it was impossible to utilize for staves by the old method.

TABLE 2.—*Production of tight barrel staves in 1905, by States.*

[Quantities expressed in thousands.]

States.	Total.		Sawed.		Bucked and split.		Hewed.		Beer-and ale.	
	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.
Alabama	5,955	2.5	5,893	2.9	59	0.6	3	.....	.....	.....
Arkansas	23,939	9.9	21,192	10.4	1,930	17.9	.....	.....	817	4.6
Illinois	8,459	3.5	7,756	3.8	.....	.....	3	.....	700	4.0
Indiana	8,800	3.7	7,500	3.7	1,300	12.0	.....	.....	.....	.....
Kentucky	61,270	25.3	46,980	23.3	2,137	19.8	43	0.4	12,110	68.8
Louisiana	15,095	6.3	4,506	2.2	2,800	25.9	7,384	71.0	405	2.3
Michigan	1,325	.6	1,325	.6	.....	.....	.....	.....	.....	.....
Mississippi	6,798	2.8	4,381	2.2	1,119	10.4	1,298	12.5	.....	.....
Missouri	26,993	11.2	24,871	12.3	590	5.5	.....	.....	1,532	8.6
New York	1,191	.5	1,050	.5	40	.4	70	.7	31	.2
Ohio	12,712	5.2	12,712	6.3	.....	.....	.....	.....	.....	.....
Pennsylvania	2,704	1.1	2,561	1.3	.....	.....	.....	.....	143	.8
Tennessee	37,468	15.6	35,093	17.4	.....	.....	1,575	15.2	800	4.5
Texas	3,451	1.4	2,968	1.5	230	2.1	20	.2	233	1.3
Virginia	2,045	.9	1,495	.7	500	4.6	.....	.....	50	.3
West Virginia	11,353	4.7	11,353	5.6	.....	.....	.....	.....	.....	.....
Wisconsin	745	.3	.....	.....	.....	.....	.....	.....	745	4.2
All other	10,890	4.5	10,733	5.3	87	.8	.....	.....	70	.4
Total	241,193	100.0	202,369	100.0	10,792	100.0	10,396	100.0	17,636	100.0
Per cent of total	100		83.9		4.5		4.3		7.3	

Table 3 shows the number of sawed staves of the different grades produced during the year, together with their value according to average quotations on the Chicago market. The spot value may be fairly well estimated for any point by deducting the transportation charges from point of shipment.

One of the interesting points brought out in this table is the percentage of alcoholic stock which oak forests are now yielding. The bourbon and the spirit and wine staves combined make 24 per cent of all staves. The value per thousand of alcoholic stock is nearly double that of any other grade, so that the production is probably kept at a maximum, and since only the choicest white oak is suitable the proportion of alcoholic stock must diminish as the forest loses in quality.

Oil and tierce sawed staves comprise 51 per cent of all sawed staves if white oak alone is considered and more than 55 per cent if red oak is also included. They rank first in total value also. Red oak has been used for tight cooperage only a few years. It appears to have proved only fairly satisfactory, since it comprises but 3.8 per cent of the total amount and sells for less than white oak.

TABLE 3.—*Quantity and value of sawed staves produced in 1905.*

Grade.	Timber.	Number	Per cent.	Price per M.	Value.
		Thousand.			
Oil and tierce	White oak	104,067	51.3	$32	$3,330,144
Spirit and wine	do	28,094	13.9	50	1,404,700
Bourbon	do	20,469	10.1	65	1,330,485
Oil and tierce	Red oak	7,737	3.8	30	232,110
Pork	White oak	6,860	3.4	24	164,640
Half barrel	do	3,821	1.8	39	149,019
Cut-offs	Red oak and white oak	16,770	8.4	12	201,240
All others	Miscellaneous	14,551	7.3	22	320,122
Total		202,369	100.0		7,132,460

It is important to note the extent to which other woods have been substituted for white oak in tight cooperage. By combining the miscellaneous woods with the red oak it appears that 11 per cent of the sawed staves are produced from other species than white oak.

Under the heading "All others" are included a variety of grades, chiefly sirup, glucose, lead, and fish package staves. These are made from several kinds of timber, of which the principal ones are red gum, white pine, cypress, and ash. Altogether they furnished 7.3 per cent of the total.

Table 4 gives the quantity and value of the bucked and split staves, exclusive of beer stock. This stock, used almost entirely for making packages to contain alcoholic liquors, is the highest grade which it is possible to produce. A large proportion of it is exported, although much of it finds its way to California to be used for eastern shipments of wine. Bourbon staves constitute nearly one-half of the total number.

TABLE 4.—*Quantity and value of bucked and split staves produced in 1905.*

Grade.	Number.	Per cent.	Price per M.	Value.
	Thousand.			
Bourbon	5,020	46.5	$65	$326,300
West Indian	1,966	18.2	70	137,620
Spirit and wine	1,882	17.4	52	97,864
Seconds	1,538	14.3	30	46,140
One-half barrel	291	2.7	39	11,349
Cut-offs	95	.9	15	1,425
Total	10,792	100.0	.....	620,698

Though statistics are wanting to show it, the fact is well known that the production of split staves has decreased very rapidly within a comparatively few years, owing to the steady increase in the value of white-oak timber, which has resulted in the perfecting of the stave saw and the improvement of manufacturing methods generally.

Table 5 gives the quantity and value of hewed stock. The French claret stave constitutes practically the whole of this class of stock, which is primarily an export grade. The values have been obtained by using average New Orleans quotations for 1905.

TABLE 5.—*Quantity and value of hewed staves produced in 1905.*

Grade.	Number.	Per cent.	Price per M.	Value.
	Thousand.			
French claret	10,193	98.1	$75	$764,475
Pipe	95	.9	150	14,250
All others	108	1.0	200	21,600
Total	10,396	100.0	.....	800,325

Table 6 shows the quantity and value of the heading. The values given represent, approximately, the average Chicago market.

TABLE 6.—*Quantity and value of sawed heading produced in 1905.*

Grade.	Number of sets.	Per cent.	Price per set.	Value.
	Thousand.			
Oil and tierce	[a] 5,707	51.9	$0.20	$1,097,200
Bourbon	1,897	17.2	.50	948,500
Spirit and wine	1,581	14.3	.35	553,350
Half barrel and keg	1,152	10.4	.16	184,320
Pork	208	1.9	.18	37,440
All others	478	4.3	.16	74,080
Total	11,023	100.0	.26	2,894,890

[a] Includes 221 thousand sets of red oak.

Table 7 shows the quantity and value of the staves and heading produced for beer and ale packages. One reason for the small percentage of barrel stock is that timber suitable for manufacture into these large staves is becoming scarce, or at least difficult to obtain.

TABLE 7.—*Quantity and value of beer and ale stock produced in 1905.*

STAVES.

Size.	Number.	Per cent.	Value.
	Thousand.		
Barrel	1,178	6.7	$123,690
Half barrel	6,123	34.8	397,995
Quarter barrel	7,380	41.9	383,760
Eighth barrel	2,333	13.2	74,656
Ale barrel	96	.5	12,960
Half ale barrel	50	.2	5,000
Ale and beer hogshead	476	2.7	85,680
Total	17,636	100.0	1,083,741

HEADING.

Size.	Number of sets.	Per cent.	Value.
	Thousand.		
Barrel	307	15.8	$153,500
Half barrel	543	28.1	135,750
Quarter barrel	740	38.2	148,000
Eighth barrel	346	17.9	34,600
Total	1,936	100.0	471,850

An industry more completely dependent upon one species of timber than is tight cooperage would be difficult to find. Tight cooperage depends upon white oak, and white oak of good quality. A single defect in a stave or head may cause the loss of the contents of the entire package. For alcoholic liquors only the best white oak will serve. Stock of this grade is always in demand and commands the highest price. In quantity, oil and tierce cooperage ranks first, but since this grade is very largely made from timber which will not make alcoholic stock it can in one sense be termed a second grade, though this refers to the sawed staves.

Table 8 gives detailed statistics of the production of staves by States. The tabulation indicates very clearly the region in which the industry is centered. This, as might be expected, is the heart of the great hardwood forests and includes the States of Kentucky, Tennessee, Missouri, and Arkansas, which together furnish 62 per cent of the total number of staves. The 9.9 per cent credited to Arkansas is probably less than the actual amount, because companies, though operating in Arkansas, frequently reported production as from Tennessee or Kentucky, where the home office and original plants are located. The same is true of Mississippi, credited with but 8 firms and 2.8 per cent of the total production, where fewer mills are operated than in Arkansas, but where large quantities of timber are worked into bolts and shipped to Tennessee mills to be converted into the finished product.

TABLE 8.—*Production of tight barrel staves, by classes and States, 1905.*

[Quantities expressed in thousands.]

States.	Total.			Sawed staves.						
	Number of firms.	Number.	Per cent.	Oil and tierce.	Spirit and wine.	Bourbon.	Pork.	One-half barrel.	Cut-offs.	Miscellaneous.
Alabama	5	5,955	2.5	4,856	228	146	75	28	560	.....
Arkansas	18	23,939	9.9	13,087	5,363	618	200	218	1,694	12
Illinois	4	8,459	3.5	5,433	1,521	.....	113	43	646	.....
Indiana	4	8,800	3.7	2,700	800	3,000	500	200	300	.....
Kentucky	40	61,270	25.3	24,482	6,100	10,550	654	663	3,325	1,206
Louisiana	9	15,095	6.3	2,054	957	886	122	85	402	.....
Michigan	3	1,325	.6	780	.....	.....	480	.....	65	.....
Mississippi	8	6,798	2.8	3,210	440	277	104	.....	350	.....
Missouri	8	26,993	11.2	11,893	7,729	.....	242	850	4,157	.....
New York	3	1,191	.5	.....	750	.....	.....	300	.....	.....
Ohio	4	12,712	5.2	12,712	.....	.....	.....	.....	.....	.....
Pennsylvania	3	2,704	1.1	2,200	111	.....	.....	50	200	.....
Tennessee	22	37,468	15.6	18,493	3,895	1,190	3,750	1,324	3,708	2,733
Texas	3	3,451	1.4	606	200	1,852	200	60	50	.....
Virginia	3	2,045	.9	.....	.....	1,150	345	.....	.....	.....
West Virginia	8	11,353	4.7	9,165	.....	800	75	.....	1,313	.....
Wisconsin	3	745	.3	.....	.....	.....	.....	.....	.....	.....
All other	5	10,890	4.5	133	.....	.....	.....	.....	.....	10,600
Total	153	241,193	100.0	111,804	28,094	20,469	6,860	3,821	16,770	14,551

States.	Bucked and split staves.						Hewed staves.		
	Bourbon.	West Indian.	Spirit and wine.	Seconds.	One-half barrel.	Cut-offs.	French claret.	Pipe.	All other.
Alabama	14	30	2	13	.....	.....	3	.....	.....
Arkansas	306	239	728	482	175	.....	.....	.....	.....
Illinois	.....	.....	.....	.....	.....	.....	3	.....	.....
Indiana	1,000	.....	.....	200	50	50	.....	.....	.....
Kentucky	1,445	125	65	440	17	45	.....	25	18
Louisiana	1,100	890	710	100	.....	.....	7,314	.....	70
Mississippi	909	5	.....	205	.....	.....	1,298	.....	.....
Missouri	246	.....	197	98	49	.....	.....	.....	.....
New York	.....	40	.....	.....	.....	.....	.....	70	.....
Tennessee	.....	.....	.....	.....	.....	.....	1,575	.....	.....
Texas	.....	50	180	.....	.....	.....	.....	.....	20
Virginia	.....	500	.....	.....	.....	.....	.....	.....	.....
All other	.....	87	.....	.....	.....	.....	.....	.....	.....
Total	5,020	1,966	1,882	1,538	291	95	10,193	95	108

States.	Beer staves.						
	Barrel.	Half barrel.	Quarter barrel.	Eighth barrel.	Ale barrel.	Ale half barrel.	Ale and beer hogshead.
Arkansas	152	245	335	85	.....	.....	.....
Illinois	.....	100	500	100	.....	.....	.....
Kentucky	576	4,561	4,870	1,602	86	50	365
Louisiana	30	150	125	80	10	.....	10
Missouri	103	390	745	261	.....	.....	33
New York	31	.....	.....	.....	.....	.....	.....
Pennsylvania	11	8	24	100	.....	.....	.....
Tennessee	.....	350	400	50	.....	.....	.....
Texas	100	65	.....	.....	.....	.....	68
Virginia	.....	50	.....	.....	.....	.....	.....
Wisconsin	120	189	381	55	.....	.....	.....
All other	55	15	.....	.....	.....	.....	.....
Total	1,178	6,123	7,380	2,333	96	50	476

Kentucky, Tennessee, Missouri, and Arkansas rank first in the production of sawed staves, and Indiana, Kentucky, and Louisiana in the production of bucked and split staves. Only ten States participate in the production of the latter class of stock, and of these Tennessee, Mississippi, and Louisiana also furnish practically all of the hewed staves.

Beer staves have not been listed under "bucked or split," where they would otherwise belong, because of the distinct character of the stock. Though attempts have been made to manufacture beer stock on the cylinder saw, results have not been entirely satisfactory, and by far the larger part of it is still produced, as formerly, by splitting. The table indicates that Kentucky furnishes fully 50 per cent of the total amount; but much of the stock reported from Kentucky was, in fact, produced in other States by companies having their home offices in Kentucky, so that the total figure for Kentucky is too high. There is good reason to believe that Tennessee produces nearly as much as Kentucky. The statistics on the distribution of the production for this class of stock are far from satisfactory, because so much of it is manufactured by small operators and sold to a few large operators and dealers who were unable to report the sources of their supply.

TABLE 9.—*Production of tight barrel heading, by States, 1905.*

[Quantities expressed in thousands.]

States.	Number of sets.	Per cent.	Sawed heading.						Beer heading.			
			Oil and tierce.	Bourbon.	Spirit and wine.	Half barrel and keg.	Pork.	All other miscellaneous.	Barrel.	Half barrel.	Fourth barrel.	Eighth barrel.
Alabama	3	(a)	1	.....	.....	2	.....	.....	.....	.....	.....	.....
Arkansas	958	7.4	509	36	33	11	.....	15	43	126	145	40
Illinois	1,256	9.7	843	32	173	28	.....	180	.....	.....	.....	.....
Indiana	220	1.7	80	60	20	35	25	.....	.....	.....	.....	.....
Kentucky	4,029	31.2	1,024	1,087	350	290	48	29	159	262	528	252
Louisiana	80	.6	45	.....	35	.....	.....	.....	.....	.....	.....	.....
Michigan	178	1.3	39	.....	.....	4	135	.....	.....	.....	.....	.....
Mississippi	35	.3	.....	26	4	5	.....	.....	.....	.....	.....	.....
Missouri	1,549	11.9	986	18	343	189	.....	.....	1	10	.....	2
New York	400	3.1	.....	.....	.....	400	.....	.....	.....	.....	.....	.....
Ohio	839	6.5	839	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oregon	10	.1	.....	.....	.....	.....	.....	.....	.....	.....	.....	10
Pennsylvania	113	.9	45	.....	8	.....	.....	.....	4	4	12	40
South Carolina	1	(a)	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tennessee	2,323	17.9	1,195	363	565	188	.....	.....	.....	5	5	2
Texas	66	.5	.....	.....	.....	.....	.....	.....	20	46	.....	.....
West Virginia	425	3.3	100	275	50	.....	.....	.....	.....	.....	.....	.....
Wisconsin	220	1.7	.....	.....	.....	.....	.....	.....	80	90	50	.....
All other	254	1.9	.....	.....	.....	.....	.....	254	.....	.....	.....	.....
Total	[b]12,959	100.0	5,707	1,897	1,581	1,152	208	478	307	543	740	346

[a] Less than one-tenth of 1 per cent.
[b] Reports from 67 firms.

Table 9 indicates the distribution of the production of tight barrel heading. Since heading requires the same kind of timber as staves, it is not surprising to find the bulk of the production in practically

the same region. Kentucky leads all others, furnishing more than 30 per cent, followed by Tennessee, Missouri, Illinois, and Arkansas. Though 67 firms engaged in the manufacture of heading in 1905, the bulk of the stock was produced by comparatively few firms, less than one-fourth of the total number. During 1904 the statistics gathered by the Tight Barrel Heading Manufacturers' Association, which includes some twelve or fifteen manufacturers only, showed that their combined production amounted to over 8,000,000 sets, or approximately 61.5 per cent of the total amount reported for 1905. The amount of split heading was so small that it was not tabulated separately, but included under "Sawed heading." As in the case of beer staves, beer heading has been tabulated separately.

Approved:

JAMES WILSON,

Secretary of Agriculture.

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